

i-Tree: Using simplified technology and partnerships to communicate science



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What is i-Tree?

A series of FREE tools that quantify ecosystem services and values from trees and aid forest management



*i-Tree is a
Cooperative
Initiative*



History

```
%LET FILLADDR = 'FILL';          /* Station address used when no pollution data available. */
%LET FILLCITY = 'FILL FROM MEAN'; /* Cityname used when no pollution data available. */

/* CODE CHANGE 11/06/98 D.CRANE - Added the macro variables below. */

%LET NLAY = 30; /* The number of layers in canopy. */
%LET LAI_DIF1 = 0.1; /* The diff. in LAI for LAI's 0 to 1 in RCAN table. */
%LET LAI_DIF2 = 0.5; /* The diff. in LAI for LAI's 1 to 5 in RCAN table. */
%LET LAI_DIF3 = 1.0; /* The diff. in LAI for LAI's 5 to 13 in RCAN table. */

/* CONSTANTS - DO NOT CHANGE */

%LET PI = 3.141592654;
%LET ZCONS = 6.096; /* HT OF WEATHER STATION (M) */
%LET ZO = 0.2; /* ZO GRASS / AIRPORT - ROUGHNESS LENGTH */
%LET DISPL = 0.6; /* DISPLACEMENT HT GRASS - AIRPORT*/
%LET WINCONS = (&ZCONS-&DISPL);
%LET K = 0.41; /* VON KARMAN'S CONSTANT */
%LET BETAM = 4.7; /* A DIMENSIONLESS CONSTANT IN THE DRAG FRICTION VELOCITY*/
%LET ACCGRAV = 9.81; /* ACCELERATION DUE TO GRAVITY M/SEC2*/
%LET PR = 0.72; /* PRANDL NUMBER */
%LET SCNO2 = 0.98; /* SCHMIDT NO. FOR NO2 */
%LET SCSO2 = 1.15; /* SCHMIDT NO. FOR SO2 */
%LET SCO3 = 1.00; /* SCHMIDT NO. FOR O3 */
%LET SCCO = 0.76; /* SCHMIDT NO. FOR CO */
%LET HRS_DAY = 24; /* Hours per day */
%LET MNTHS_YR = 12; /* Months per year */
%LET ATMOSPH = 1.01325; /* 1 atmosphere in bars */
%LET M3_MOLE = 0.0224; /* m3 per mole. */
```

Estimating Leaf Area and Leaf Biomass of Open-Grown Deciduous Urban Trees

David J. Nowak

ABSTRACT. Logarithmic regression equations were developed to predict leaf area and leaf biomass for open-grown deciduous urban trees based on stem diameter and crown parameters. Equations based on crown parameters produced more reliable estimates. The equations can be used to help quantify forest structure and functions, particularly in urbanizing and urban/suburban areas. *For. Sci.* 42(4):504-507.

Additional Key Words. Allometric equations.

Additional Key Words. Allometric equations, urban vegetation, urban ecology.

MEASUREMENT OF TREE LEAF AREA and leaf biomass are important prerequisites to studying gas-exchange processes and modeling ecosystems. Few researchers have evaluated leaf area or leaf biomass of open-grown trees, particularly in urban environments (Gacka-Grzesikiewicz 1980). Accurate estimates of tree leaf area and biomass in both urban and surrounding natural areas are important for estimating evapotranspiration, atmospheric deposition, and carbon sequestration. Leaf area, leaf biomass, and leaf area index are important factors in determining light interception.

Materials and Methods

In July 1992, data were collected from 54 healthy, open-grown park trees in Chicago, Illinois, that were selected for fall tree crowns in excellent condition. The sampled trees included 10 American elm (*Ulmus americana* L.), 10 green ash (*Fraxinus pennsylvanica* Marsh.), 10 hackberry (*Celtis occidentalis* L.), 10 honeylocust (*Gleditsia triacanthos* L.), and 14 Norway maple (*Acer platanoides* L.). Data were collected on dbh, tree height, height to base of crown, and crown width. The dbh ranged from 11 to 29 crown height (base of crown to crown top) and crown width from 4.1 to 14.0 m.

The dimensions of each tree and telescoping measuring rod base were measured vertically and

A modeling study of the impact of urban trees on ozone

Christopher J. Luley^a, Daniel E. Crane^a

Received 22 April 1999; accepted 16 August 1999

Abstract

Modeling the effects of increased urban tree cover on ozone concentrations (July 13–15, 1995) from Washington, DC to central Massachusetts reveals that urban trees generally reduce ozone concentrations in cities, but tend to increase average ozone concentrations in the overall modeling domain. During the daytime, average ozone reductions in urban areas (1 ppbv) were greater than the average ozone increase (0.26 ppbv) for the model domain. Interactions of the effects of trees on meteorology, dry deposition, volatile organic compound (VOC) emissions, and anthropogenic emissions and boundary layer heights, which in turn affect ozone concentration, are complex. Changes in surface temperatures, wind speeds, and hourly ozone levels on ozone concentrations and meteorology. Increases in urban tree cover lead to increases in emissions. However, nighttime ozone concentrations increased due to reduced wind speeds and less mixing of air masses composed of scavenging of ozone from increased deposition of NO_x. Overall, 8-hour average ozone concentration in urban areas dropped by 0.5 ppbv (1% throughout the day). © 2000 Elsevier Science Ltd. All rights reserved.

Introduction

Vegetation in cities, particularly trees, can directly and indirectly affect air quality. Tree transpiration and tree canopies affect air meteorology (air temperature, radiation absorption and heat storage, wind speed, relative humidity, turbulence, surface albedo, surface roughness and consequently the evolution of the mixing-layer height) (e.g. Heister et al. 1995; Bernier et al. 1997), reduce the deposition of the fine particles of the mixing-layer (e.g. Heister et al. 1995; Bernier et al. 1997) (b) volatile organic compounds (VOCs) (c) emission of radiation of organic compounds (VOCs) (d) emission of carbon monoxide (CO) and carbon monoxide (CO) (Brasseur and Chatfield, 1991) and (d) anthropogenic emissions through reduced energy use due to lower air temperature and shading of buildings. While lower pollution emissions generated by buildings. While lower nitrogen oxide (NO_x) emissions improve air quality around-level emissions may lead to a local increase in O₃ concentrations under certain conditions due to reduced NO_x concentrations (Rao and Mount, 1994). Physical changes of O₃ (Rao and Mount, 1994), which lead to a decrease in O₃ concentrations. These effects are all interrelated and have to be taken into account. The effects of vegetation on air quality are atmospheric chemistry and physics, all interrelated and have to be taken into account. The effects of vegetation on air quality are atmospheric chemistry and physics, all interrelated and have to be taken into account. The effects of vegetation on air quality are atmospheric chemistry and physics, all interrelated and have to be taken into account.

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Brooklyn's Urban Forest

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Daniel E. Crane
Jack C. Stevens
Myriam Ibarra



Problem: Limited Use and Impact



Problem: Limited Use and Impact

🌳 Solution: “Tell to Sell”



Problem: Limited Use and Impact

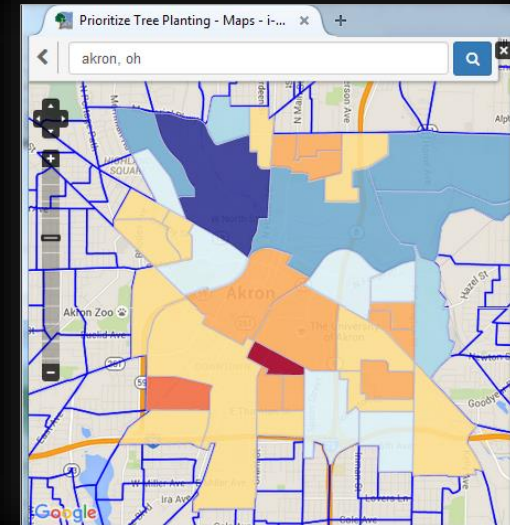
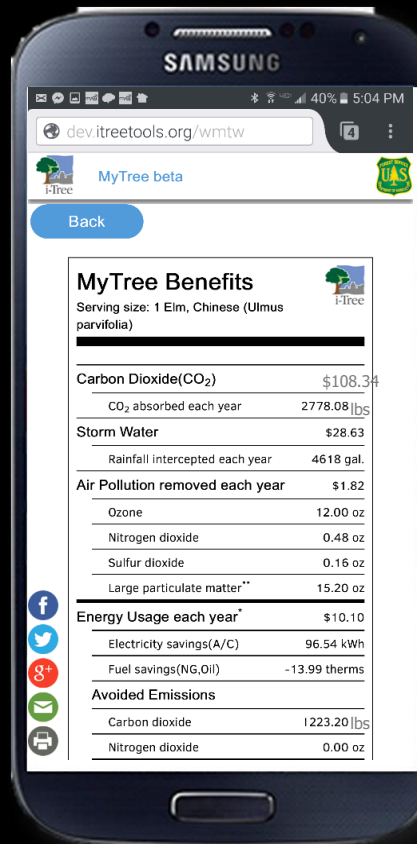
🌳 Solution: “Tell to Sell”

🌿 KISS

🌿 Impacts: human health, environmental quality (why?)

🌿 Simple reports and technology

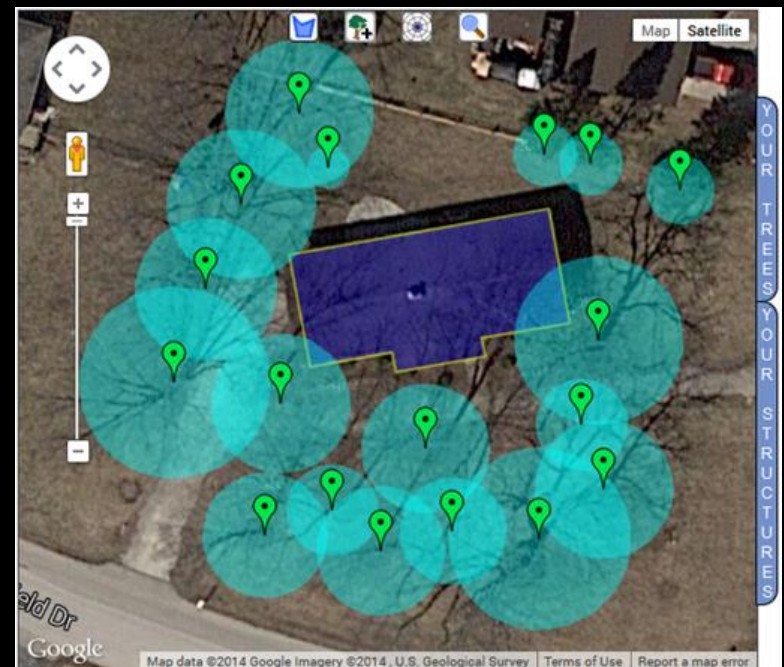
Simplification and Automation



i-Tree
Ecosystem Analysis

Universidad Autonoma de Santo Domingo

Urban Forest Effects and Values
May 2018



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🌿 Simple reports and technology

🌿 Communicate w/in FS and externally

🌿 i-Tree: partnership of S&PF and R&D

🌿 Use communication staff – press releases

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Solution: “Tell to Sell”

KISS

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Communicate w/in FS and externally

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-  Use communication staff – press releases

Listen/ask - Engage stakeholders

-  Hold listening sessions

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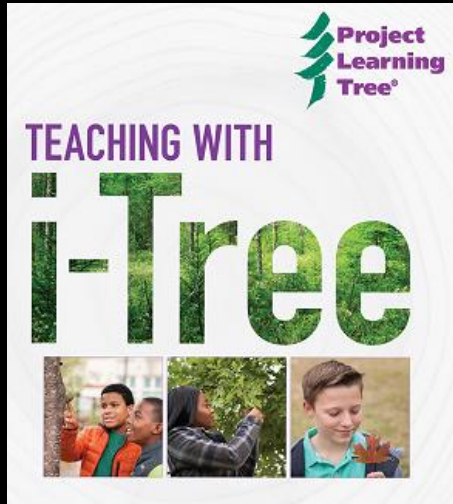
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Develop Partners - share

Partners



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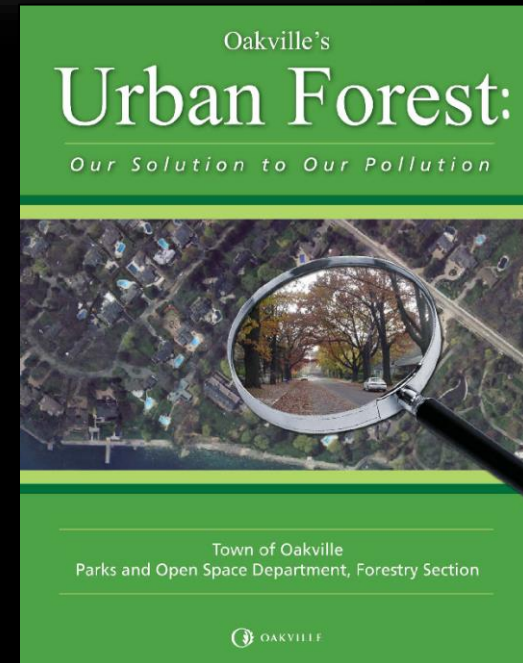
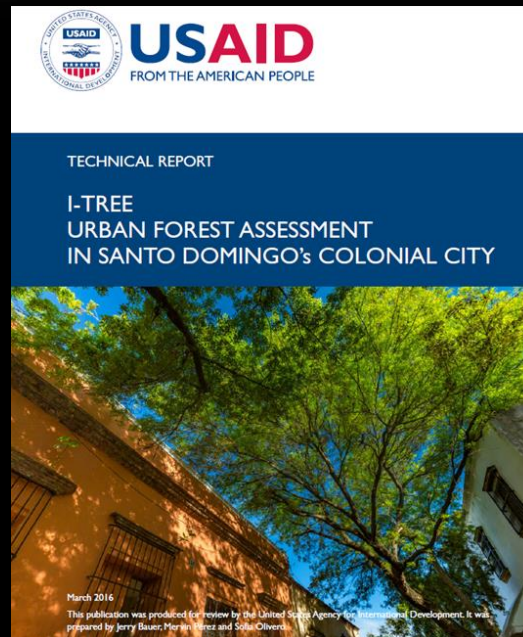
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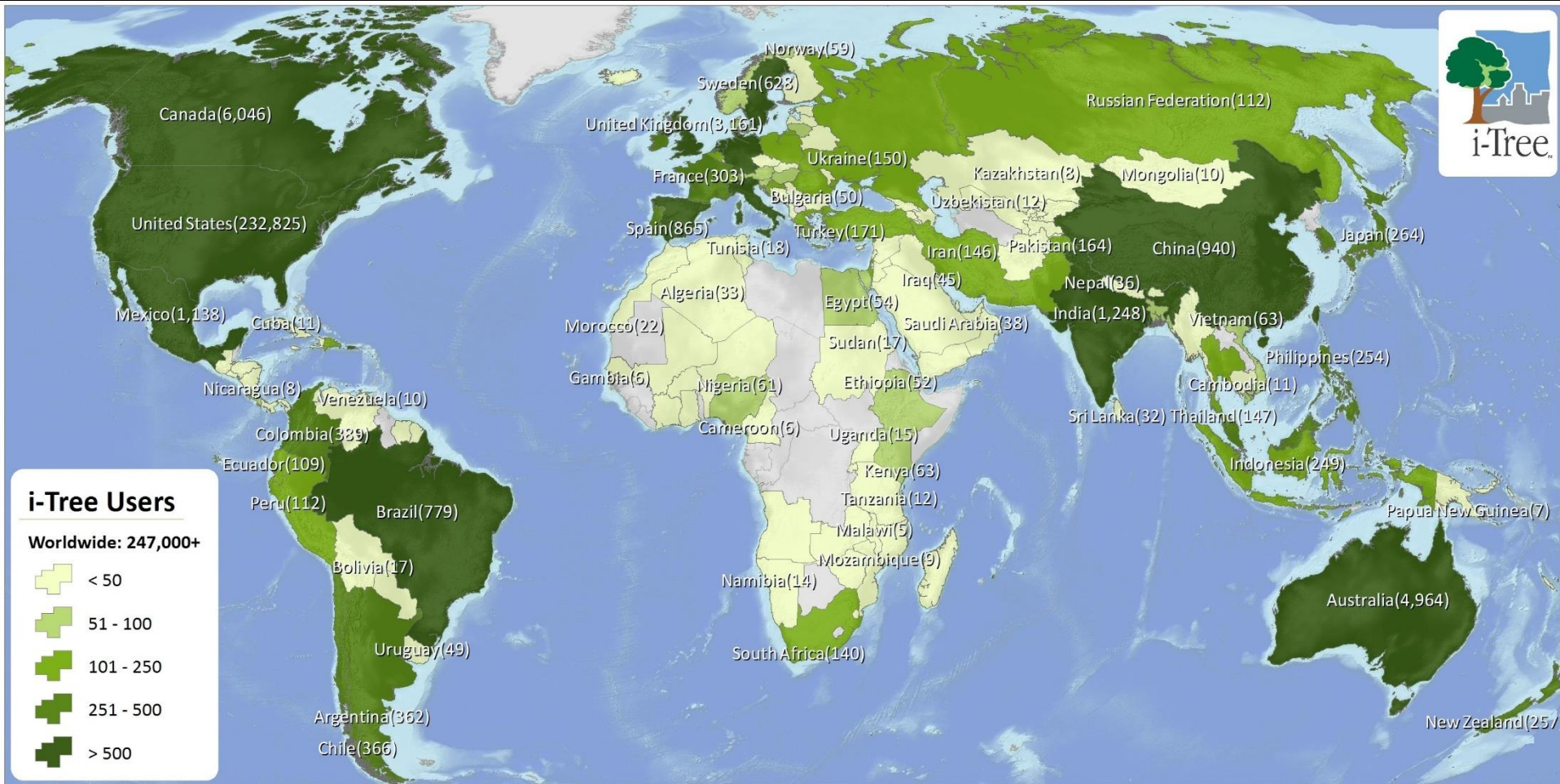
Develop Partners - share

Share / promote successes

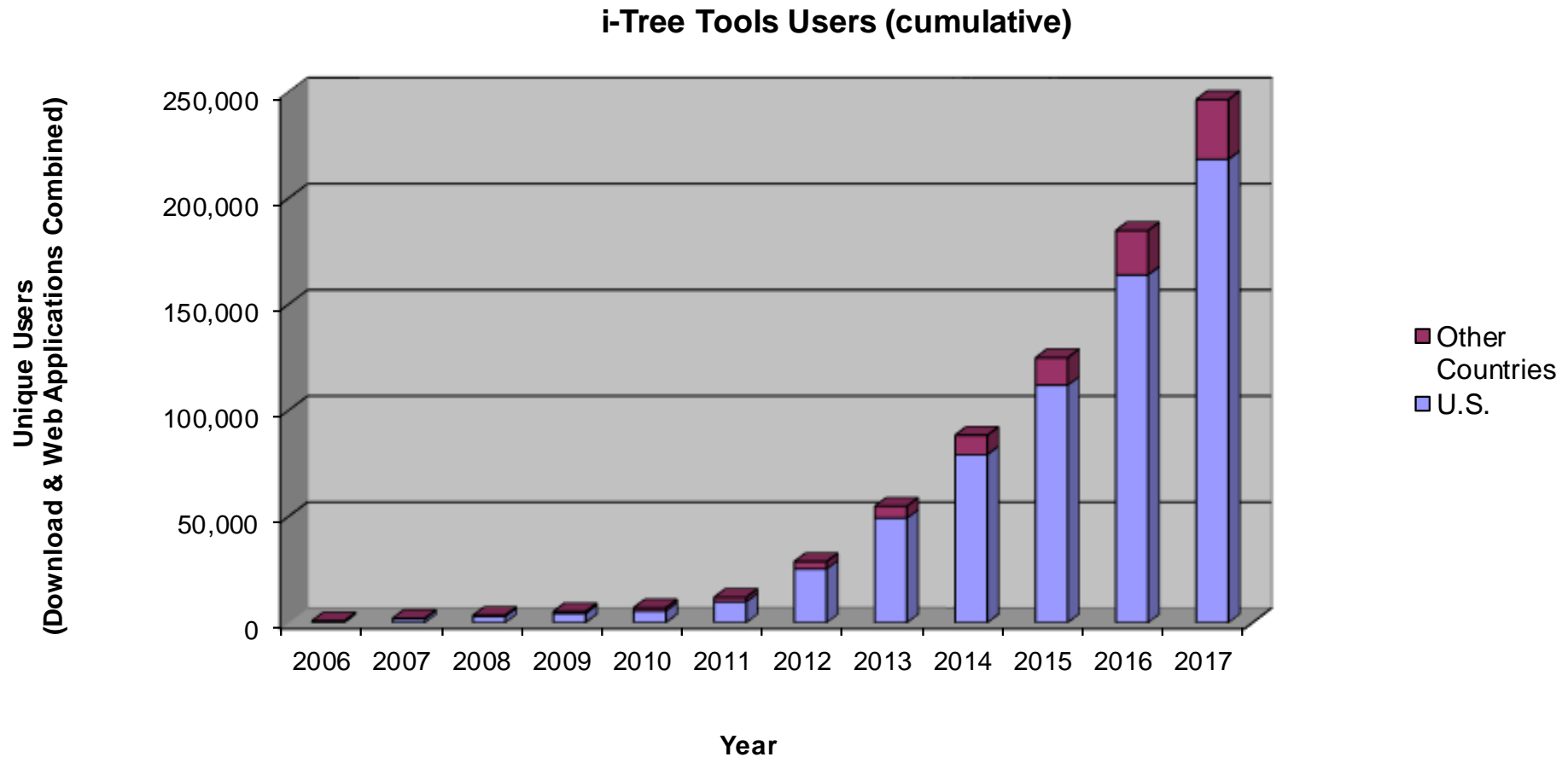
Successes / Innovations



Global Usage



Growing Usage



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Develop Partners - share

Share / promote successes

Be innovative



[i-Tree Tools](#)

[News](#)

[Resources](#)

[Support](#)

What is i-Tree?

- Free and easy to use tools
- Quantifies tree structure, threats, and benefits globally
- Built upon peer-reviewed, public-domain science

Visit the [About i-Tree](#) page for more details

Which tool should I use?

For forests and many trees:



Eco

(desktop app)

Flagship tool that quantifies the structure of, threats to, and benefits and values provided by forest populations globally.



Landscape

(web app)

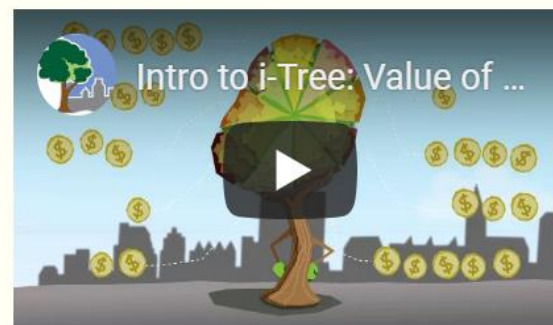


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Intro to i-Tree



Teaching with i-Tree

New curriculum available for grades 3-12!



Questions

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